DOCUMENT RESUME

ED 267 567 EC 182 088

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TITLE Current Achievement and Reactions of Secondary School Students to Their Experiences in an Early Childhood Program for the Intellectually Gifted: A Longitudinal Study of the Astor Program.
PUB DATE Nov 85
NOTE 34p.; Paper presented at the Annual Convention of the National Association for Gifted Children (32nd, Denver, CO, November 2-8, 1985).
AVAILABLE FROM Virginia Z. Ehrlich, Box 223, Teachers College, Columbia University, New York, NY 10027 ($10.00 for full report, prepayment required).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Tests; Early Childhood Education; Followup Studies; *Gifted; Models; Program Effectiveness; Special Classes; Student Attitudes

ABSTRACT

Followup of 129 students who had been in an early childhood program for gifted students was carried out via analysis of achievement test data in vocabulary, reading, comprehension, total reading, and total mathematics. Data were obtained for three groups of students exposed to varying periods of time in the program. Findings indicated that students who had been part of the program during their prekindergarten/primary years, on the whole, retained or exceeded their high level of achievement in later years. Analysis of student ratings of the program produced generally positive reactions and revealed that the students acquired a love of learning and reading which has increased with time. Asked about specific topics they had studied while in the program, students in the program from pre-K to grade 3 recalled significantly more topics than those who joined them after grade 3. (CL)

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CURRENT ACHIEVEMENT AND REACTIONS OF SECONDARY SCHOOL STUDENTS TO THEIR EXPERIENCES IN AN EARLY CHILDHOOD PROGRAM FOR THE INTELLECTUALLY GIFTED: A Longitudinal Study of the Astor Program*

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It is an unfortunate aspect of educational innovations that most have short lives, including many that have achieved their goals and have proven worthy of continued existence. Usually, the duration of innovative programs is defined by the period of extra funding. The Astor Program for Gifted Children was introduced as an innovation in the public schools of New York City in 1973-74 under private funding to meet the needs of exceptionally gifted children beginning at age four. It remains a thriving program which has had an impact on educational planning and curriculum not only within the confines of the communities where it was introduced, but also throughout New York City, the United States, and even in foreign countries.

Therefore, when a program such as this survives the transition from private to public funding, the trials of budget cutbacks, changes in administration, supervision, personnel, and the mere passage of time and dimming of memories, one may justly ask: "What are the factors that have led to its survival as a concept and as an active educational model?"

In the present report, only the impact on the students is reported. The full study covered reactions of principals, teachers and parents as well as students, and explored other factors that may have contributed to the success and endurance of the program.**

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* Presentation at the NAGC Convention, Denver, Colorado, November 2-6, 1985.

**The full report may be obtained by writing to the author at Box 223, Teachers College, Columbia University, New York, New York 10027. (Prepayment required, $10.00)

PURPOSES OF THE STUDY

In this part of the study, we were concerned with whether the pupils had maintained their relatively high status in achievement and with their reactions to the experience in the Astor Program from prekindergarten through grade three.

SOME BACKGROUND NOTES

Children were admitted to the first classes at ages four to five and a half on the basis of an extensive screening procedure that included the administration of a Stanford-Binet Test among its criteria. A special curriculum was designed to meet their high levels of ability and classroom practices were developed that combined a flexible pattern within a framework of careful planning and organization by the teacher. Materials describing the curriculum and classroom practices remain in demand. (1)

PRESENT STATUS OF THE EARLY ASTOR PROGRAM STUDENTS

Every effort was made to trace as many students as possible and to obtain current school records of achievement on standardized tests. This, in itself, proved to be a long and difficult process. Of special importance here is the grade level of the students at the time of this research. Because of differing practices in the several school districts, students had advanced at various rates beyond the third or fourth grade. Some had been accelerated two or more grades in elementary school. Some, attending New York City schools, were placed in accelerated (SP - Special Progress) classes, so that they would complete grades 7-8-9 in two years. Others, who had transferred to private schools or had moved out of the city to other localities, were advanced according to local practices. Thus, the grade range of the pupils as of 1981-82 was from grade 6 to grade 8, with a few already in grade 9 or high school. For most four-year-olds, our early admission policy proved

to be a first acceleration for more than 95 per cent of the pupils, since they advanced directly into the first grade immediately after the first year in Level I or the Prekindergarten/Kindergarten class.

ACHIEVEMENT IN READING AND MATHEMATICS

As was summarized in the 1978 report (1, p.180), after two to three and one-half years of exposure to the Astor Program in prekindergarten through grade three, there were "statistically significant gains in achievement, specifically in the areas of word knowledge, reading, and mathematics, ... in comparison with a national norming population of high achievers."

A question that is frequently raised about gifted children, especially when they are identified at an early age, is: "Do they continue to achieve at the levels they attained during the early years?" The following analyses are an attempt to answer this question. However, there were many factors that had to be considered before they could be made. These included test variety, the uses of percentile scores, comparability of the pupil population with the basic group, the groups to be used, and the numbers available in each category.

Test Variety

Since we were dealing with different school systems, we had to determine how data from different tests could be used. These criteria were established:

1. All had to be well recognized standardized tests with comparable sub-parts and national norms, such as the California, Metropolitan, or Stanford Achievement Tests. As it turned out, almost all the test results were derived from records of the New York City public school system, which in 1980-82 used the California Achievement Tests in Reading and the Stanford Tests in Mathematics. Of the 129 students involved in the achievement study, there were records available for nine who were in schools outside the

city. These were based on the following tests, all nationally normed: Stanford, California, SRA, Iowa, and Lorge-Thorndike Cognitive Abilities.

2. All achievement test data used were based on the most recent tests taken in the spring for each grade, 6 through 8. Ninth grade results were not available.

The Use of Percentile Scores for Comparisons

The reporting of achievement scores varies from system to system and school to school. They use grade equivalents, stanines, percentiles, standard score, and even raw scores alone. However, most data could be translated to percentiles from tables provided by test publishers.

In terms of interpretation, the percentile yields the most straightforward basis of comparison, provided no elaborate statistical treatment is required. We resorted to reporting the per cent of pupils attaining given percentiles, thus yielding a figure that could be treated statistically, if desired. However, considering the many variations in pupil conditions, including current grade level, location, school system, etc., anything more complex could not be justified and could only prove misleading.

Comparability of Pupil Population with Basic Group

Another point that must be considered in a longitudinal study is: "How similar is the follow-up population to the original group with which it is being compared?"

Since this was a program designed specifically for the intellectually gifted, IQ levels of the groups being compared are most relevant. Records were available for all pupils who were admitted in 1974-75 into Level I,

the prekindergarten/kindergarten classes. For those who were added to the Astor Program classes after June, 1977, IQ's were available for 75 percent of the students. The distribution of IQ's for the latter group may be considered approximately equal to the others first, because of the data on hand for such a large proportion of the group and second, because of the exceptionally high achievement records of all these pupils. Their addition to the Astor Program classes was made on the basis of exceptional performance in reading and mathematics at the time of admission.

The mean Stanford-Binet IQ for the original population in 1974-75 for the classes used in this study was 149.5. For the total sample used in this report, the mean was 145.9. The average IQ's for each sub- population (described in the next section) were: 146.1, 148.2, and 144.8. Thus, it will be seen that the groups used in the follow-up study were comparable to the total basic population and to each other in intellectual capacity.

The Three Sub-Groups of the Longitudinal Study

Data were obtained for students who had been exposed to varying periods of time under the Astor Program. Therefore, three major groups were defined:

Pioneers, 1974,75-77: Pupils who had been in the Astor Program prekindergarten or kindergarten (depending on age of admission) through June, 1977.

Pioneers, 1974,75-81,82: Pupils who remained with the program in the original school through grade 6.

Added Group, 1977-81,82 (Referred to as Others or Post-1977): Pupils who were added to Astor Program classes after 1977, when the private funding ended, and who remained with them through grade 6.

Achievement data are presented separately for these three groups.

Numbers of Pupils in Each Category

Since we were not able to obtain complete records for many students, the numbers will vary from analysis to analysis, both in the achievement study and in the report on student reactions. Achievement records were available for a total of 129 students: 16 in the Pioneer 1974,75-77 group; 53 in the Pioneer 1974,75-81,82 group; and 60 in the Added group, 1977-81,82.

ANALYSIS OF THE ACHIEVEMENT TEST DATA

Test subjects are, in effect, dictated by convention. The practice generally seems to be to give achievement tests in vocabulary, reading comprehension, total reading, and total mathematics. Since we had used these tests to conform to city school practices in our earlier study, we were limited to such data.

Reading: Total Score, Vocabulary, Comprehension

Table I summarizes the results for the three pupil groups for the Total Score in Reading. In the Pioneer group, 1974,75-77, 43.9% attained percentiles ranging from 96 to 99+, in the ninth stanine; and 37.6% attained percentiles in the eighth stanine, from 90 to 95. Thus, 81.5% attained scores in the 90th percentile or above. For the Pioneers 1974,75-81,82, the record is somewhat similar: 52.8% with percentiles in the ninth stanine, from 96 to 99+; 28.3% in the eighth stanine, from 90 through 95. Thus, 81.1% attained scores at the 90th percentile or above, very much like the previous group. Fpr the Added or Other group, 48.3% achieved percentiles in the ninth stanine, from 96 to 99+; 23.3% in the eighth stanine, from percentiles 90 to 95; and 71.6% with percentile ratings from 90 through 99+, lower than for the two Pioneer groups.

TABLE I

ACHIEVEMENT IN READING: TOTAL SCORE

		PIONEERS 1974,75-77			PIONEERS 1974,75-81,82			POST-1977 GROUP		
Stanine	%ile	F	%	% per Stanine	F	%	% per Stanine	F	%	% per Stanine
5	41-49									
	50-59				1	1.9	1.9	1	1.7	1.7
6	60-69				1	1.9		2	3.3	
	70-77	2	12.5	12.5	1	1.9	3.8			3.3
7	78-81				2	3.8		3	5.0	
	82-85	1	6.3		4	7.5		6	10.0	
	86-89			6.3	1	1.9	13.2	5	8.3	23.3
8	90-91							4	6.7	
	92-93	3	18.8		7	13.2		5	8.3	
	94-95	3	18.8	37.6	8	15.1	28.3	5	8.3	23.3
9	96	1	6.3		1	1.9		8	13.3	
	97	1	6.3		5	9.4		3	5.0	
	98	3	18.8		8	15.1		6	10.0	
	99	2	12.5	43.9	14	26.4	52.8	12	20.0	48.3
Total		16			53			60		

Generally, almost all the students were achieving at above average levels, most of them above the 90th percentile, and an impressive 44 to 53 per cent at percentile levels ranging from the 96th through 99+.

Additional Note. In 1981, 21 of 22 sixth grade Astor Program students achieved maximum scores on the Reading Test, with maximum grade equivalent scores of 12.9. The one exception achieved a grade equivalent score of 9.5. In part, this reaching of ceilings on tests reflects the weakness of many achievement tests in discriminating scores for high ability students. Nevertheless, the record of these pioneer Astor Program students was quite impressive. They also managed to gather almost every award their school distributed at graduation. The only reason several did not receive multiple awards was because the principal felt that he had to "spread the glory."

TABLE II

ACHIEVEMENT IN READING: VOCABULARY

		PIONEERS 1974,75-77			PIONEERS 1974,75-81,82			POST-1977 GROUP		
Stanine	%ile	F	%	% per Stanine	F	%	% per Stanine	F	%	% per Stanine
5	41-49	--	----		1	2.0		--	----	
	50-59	1	7.1	7.1	--	----	2.0	2	3.6	3.6
6	60-69	1	7.1		--	----		1	1.8	
	70-77	--	----	7.1	6	11.8	11.8	3	5.5	7.3
7	78-81	1	7.1		3	5.9		6	10.9	
	82-85	1	7.1		--	---		--	----	
	86-89			14.2	6	11.8	17.7	7	12.7	23.6
8	90-91	--	----		2	3.9		5	9.1	
	92-93	1	7.1		3	5.9		7	12.7	
	94-95	2	14.3	21.4	5	9.8	19.6	3	5.5	27.3
9	96	2	14.3		12	23.5		9	16.4	
	97	1	7.1		1	2.0		1	1.8	
	98	1	7.1					7	12.7	
	99	3	21.4	49.9	12	23.5	49.0	4	7.3	38.2
Total		14			51			55		

On the Vocabulary section of the reading tests, both Pioneer groups performed equally well at the highest levels. At the ninth stanine, 49.9% and 49.0% of the two Pioneer groups attained percentile scores from 96 through 99+. At the eighth stanine, 21.4% and 19.6% of these groups attained scores at percentile levels from 96 through 99+. Although the Post-1977 group did a little better in the eighth stanine, 27.3%, than the others, they did not match the Pioneers at the highest levels, percentiles ranging from 96 through 99+. (Table II)

TABLE III

ACHIEVEMENT IN READING: COMPREHENSION

		PIONEERS 1974,75-77			PIONEERS 1974,75-81,82			POST-1977 GROUP		
Stanine	%ile	F	%	% per Stanine	F	%	% per Stanine	F	%	% per Stanine
5	41-49									
	50-59				1	2.0	2.0	2	3.6	3.6
6	60-69				2	3.9				
	70-77				1	2.0	5.9	2	3.6	3.6
7	78-81							3	5.5	
	82-85	4	28.6		2	3.9		7	12.7	
	86-89	1	7.1	35.7	5	9.8	13.7	6	10.9	29.1
8	90-91				2	3.9		5	9.1	
	92-93	1	7.1		3	5.9		2	3.6	
	94-95	1	7.1	14.2	7	13.7	23.5	6	10.9	23.6
9	96	1	7.1		5	9.8				
	97	3	21.4		6	11.8		9	16.4	
	98	2	14.3		1	2.0		2	3.6	
	99	1	7.1	49.9	16	31.4	55.0	11	20.0	40.0
Total		14			51			55		

The results in Reading Comprehension (Table III) are similar to the other reading scores, which is to be expected since vocabulary and comprehension are component sections of the total score. Pioneer students performed better than the Post-1977 group at the highest level, stanine 9, with 49.9% of the Pioneers 1974,75-77 and 55.0% of the Pioneers 1974,75-81,82 achieving percentiles ranging from 96 through 99+. Only 40.0% of students in the Post-1977 group attained scores at these levels.

TABLE IV

ACHIEVEMENT IN MATHEMATICS: TOTAL SCORE

		PIONEERS 1974,75-77			PIONEERS 1974,75-81,82			POST-1977 GROUP		
Stanine	%ile	F	%	% per Stanine	F	%	% per Stanine	F	%	% per Stanine
5	41-49	--	----		--	----		--	----	
	50-59	--	----		--	----		--	----	
6	60-69	2	12.5		1	2.0		--	----	
	70-77	--	----	12.5	1	2.0	4.0	1	1.7	1.7
7	78-81	1	6.3		1	2.0		2	3.4	
	82-85	1	6.3		1	2.0		3	5.2	
	86-89	2	12.5	25.1	6	12.0	16.0	5	8.6	17.2
8	90-91	--	----		2	4.0		2	3.4	
	92-93	2	12.5		5	10.0		2	3.4	
	94-95	--	----	12.5	3	6.0	20.0	5	8.6	15.4
9	96	1	6.3		2	4.0		2	3.4	
	97	2	12.5		4	8.0		8	13.8	
	98	1	6.3		6	12.0		6	10.3	
	99	4	25.0	50.1	18	36.0	60.0	22	37.9	65.4
Total		16			50			58		

Mathematics: Total Score

Table IV summarizes the mathematics achievement data for the three groups. Although it is not to be expected that students will achieve at percentile levels that are equivalent from test to test, it is noteworthy that the Astor Program pupils attained scores in mathematics that are about as high as those they had in reading. All scores in mathematics were at percentile levels above the fifth stanine.

Among the Pioneers 1974,75-77, 50.1% attained percentile scores from 96 to 99+; 12.5%, from 90 through 95; or 62.6% from the 90th through the 99th percentiles. Of the Pioneers 1974,75-81,82, those remaining through the sixth grade, 80.0% achieved scores above the 90th percentile; 20.0%, from the 90th

through the 95th percentiles; and 60.0%, from the 96th through the 99+ percentile levels. Of the Post-1977 group, 80.8% attained scores in the eighth and ninth stanines, similar to the Pioneers 1974,75-81,82 group, but the proportion achieving scores in the ninth stanine was greater than either Pioneer group, with 65.4% attaining percentiles in the ninth stanine.

However one analyzes these data, there is no doubt that the Astor Program students did, at the very least, maintain their high standards of achievement in mathematics as well as in reading.

Changes in Achievement Status

Although as a group the children performed at high levels in their latest tests, it is well to explore another part of the picture. A more specific aspect of the question about achievement is: "To what extent did individual students retain their relative achievement status in later grades, when compared with their status at the end of the funding period?" To answer this question, individual comparisons were made between percentile rankings in 1977 and in 1981-82, depending on the last grade level for which records were obtained.

Achievement-Reading Total: From Table V we find that more than two-thirds (67.3%) of the students either retained the status achieved in 1977 on the total reading score or advanced beyond it, while 32.6% slipped back to lower levels. In the highest group, over two-thirds still achieved at levels at or above the 90th percentile, and only six (11.5%) fell below that level.

Even though some variations in performance are to be expected, some discrepancies do suggest the need for further investigation. Statistically, six pupils may not be a matter of concern. To those of us who have known these students for many years, such records are troubling. In checking the data

TABLE V

READING: STATUS CHANGE IN ACHIEVEMENT - 1977 versus 1981,82

1977 ↓ / Stanine → / ↓ %ile		←1981,82→ 4 23-40	5 41-59	6 60-77	7 78-89	8 90-95	9 96-99	f	%
4	f							-	
23-40	%								-
5	f							-	
41-59	%								-
6	f							-	
60-77	%								-
7	f		1		1	3	2	7	
78-89	%		1.9		1.9	5.8	3.8		13.4
8	f					2	2	4	
90-95	%					3.8	3.8		7.6
9	f			1	5	10	25	41	
96-99	%			1.9	9.6	19.2	48.1		78.8
TOTALS	f		1	1	6	15	29	52	
	%		1.9	1.9	11.5	28.8	55.7		99.8

for each, we could find no valid explanation there for the decline. However, our experience with other scores did make us cautious. It is and should be a matter of concern to those who enter data on permanent records when a student's scores are inconsistent with previous or current performance. In two instances, for example, we rejected records as invalid because the discrepancy between sub-parts and the total scores defied common sense, let alone statistical possibility. In another case, we were aware of a serious crisis in the child's home that was obviously interfering with performance. In still another instance, we found that the wrong norms had been used.

From a purely psychometric viewpoint, the inadequacy of many tests for measuring the achievement of highly gifted children becomes more and more apparent as maximum scores are achieved by large numbers of students, with little or no discrimination among them. These observations apply to both curriculum areas reported here, reading and mathematics, and probably apply to other tests as well.

Achievement-Mathematics: It was possible to repeat the status change analysis in mathematics for 50 students, 25 boys and 25 girls. Basically, the students did very well indeed, 80% maintaining or exceeding their earlier rankings. (Table VI) Of the 22 students who had attained earlier scores at the 96-99 percentile levels, 7 slipped back to lower levels in the latest testings. Of the seven, only one was a boy. By contrast, of the 16 students who advanced beyond their earlier status, three-fourths (12) were girls. The nature of our data is such that further analysis could prove misleading. However, in the current climate of comparisons between male and female achievement in mathematics, these notes may suggest directions for future study.

TABLE VI

MATHEMATICS: STATUS CHANGE IN ACHIEVEMENT - 1977 versus 1981,82

1977 ↓ Stanine → / ↓ %ile		← 1981,82 → 4 23-40	5 41-59	6 60-77	7 78-89	8 90-95	9 96-99	f	%
4 23-40	f							-	
	%								-
5 41-59	f					1	1	2	
	%					2.0	2.0		4.0
6 60-77	f					2	4	6	
	%					4.0	8.0		12.0
7 78-89	f			1	4	1	6	12	
	%			2.0	8.0	2.0	12.0		24.0
8 90-95	f			1	1	5	1	8	
	%			2.0	2.0	10.0	2.0		16.0
9 96-99	f			1	5	1	15	22	
	%			2.0	10.0	2.0	30.0		44.0
TOTALS	f	-	-	3	10	10	27	50	
	%			6.0	20.0	20.0	54.0		100.0

Achievement of Astor Program Students versus Others in Current Classes

It was also possible to obtain data for some Astor Program students who had advanced to the junior high school within the city school system and to compare their status within the class they were currently attending. These classes varied from being comprised almost totally of Astor Program gifted students to representing a wide range of abilities. The following discussion of this topic is based on data presented in Tables VII and VIII.

Other students for whom achievement data were available were traced to other junior high schools in the city. In these cases, only one to three Astor Program students were in each class, some of which were part of the city's established secondary sequence for the gifted. These are known as SP (Special Progress) or SPE (Special Progress Enriched) classes, depending on whether they complete the 7-8-9 grade sequence in two or three years, respectively.

In all but three cases, these students maintained their high levels of achievement in both reading and mathematics, attaining standardized test scores above the 90th percentile and, in most instances, the highest grade equivalent possible for the test given (Reading = 12.9; Mathematics = HS). One of these three was a boy (Table VII, Class E-6) who had obviously been placed in a heterogeneously grouped class, where reading levels were far below the level he had reached and who, subsequently, had to be persuaded to return to school. He protested that he was bored, tired of repeating work over and over again and that he had mastered long ago in elementary school.

Two groups advanced to classes in the junior high school which were dominated by Astor Program students. Of those who were in grade 8 in 1982, 13 out of 22 students in one SPE class were former Astor Program students

TABLE VII

ACHIEVEMENT OF ASTOR PROGRAM STUDENTS COMPARED WITH OTHERS IN THEIR CURRENT CLASS: READING

School	Class	Grade* Equivalent (highest)	Total Class f	Total Class N	Astor Program Students f	Astor Program Students N
Grade 7						
A	1	12.9	18	26	17	24
B	2	12.9	15	39	3	3
C	3	12.2+	6	34	1	1
D	4	12.9	11	36	1	1
E	5	12.9	15	33	1	2
E	6	10.5	0	27	1	1
Grade 8						
A	7	12.9	22	22	13	13
C	8	12.9	25	34	2	2
E	9	12.9	27	36	1	1
E	10	12.9	8	26	1	1
E	11	12.9	9	34	1	1
F	12	10.8+	9	32	1	1

*Percentiles for grade equivalent of 12.9 range from 93 to 99, mostly above 95. Grade equivalents listed are the highest achieved in the class.

TABLE VIII

ACHIEVEMENT OF ASTOR PROGRAM STUDENTS COMPARED WITH OTHERS IN THEIR CURRENT CLASS: MATHEMATICS

School	Class	Grade* Equivalent (highest)	Total Class f	Total Class N	Astor Program Students f	Astor Program Students N
Grade 7						
A	13	H.S.	26	26	24	24
B	14	H.S.	7	39	3	3
C	15	8.9+	24	34	1	1
D	16	H.S.	8	36	1	1
E	17	H.S.	11	33	1	2
E	18	H.S.	2	27	1	1
Grade 8						
A	19	H.S.	22	22	13	13
C	20	H.S.	33	34	2	2
E	21	H.S.	12	36	1	1
E	22	H.S.	6	26	1	1
E	23	H.S.	13	34	1	1
F	24	H.S.	17	28	1	1

*Minimum grade equivalent achieved by Astor Program students in class.

(Class A-1). The grade 7 class consisted almost entirely of Astor Program children, 24 out of a total of 26 (Class A-7).

In both classes, performance on reading and mathematics tests for the Astor Program students was excellent. Seventeen of the 24 Astor Program students in the seventh grade achieved scores equal to maximum grade equivalents of 12.9 in reading on the California Achievement Tests and a grade equivalent of HS (High School Level) in mathematics (Stanford Tests). Percentiles of a grade equivalent of 12.9 range from 93 to 99+. For the eighth grade students, the scores for the entire class were exceptionally high. All, both Astor Program and other students, attained grade equivalents of 12.9 in reading and HS in mathematics.

Summary: Achievement in Reading and Mathematics

The foregoing analyses, taken from several viewpoints, lead to the gratifying conclusion that students who had been part of the Astor Program during their prekindergarten/primary grade years, on the whole, retained their high level of achievement or exceeded it in later years. The deterioration in performance that is often predicted for such children who are identified early did not occur. If anything, the early preparation they received may have helped them acquire the skills, knowledge, and self-confidence necessary for later achievement.

PUPIL REACTIONS TO THEIR ASTOR PROGRAM EXPERIENCE

While achievement in specific curriculum areas is an important aspect of school and, apparently, the greater proportion of the former Astor Program children maintained or exceeded their high performance levels, pupil satisfaction with school was an equally important component of their experience. We followed through on this aspect of the study by using tests, questionnaires, and personal interviews.

The Attitude Scales

As had been done in the 1978 follow-up, we investigated the pupils' reactions to aspects of school with a set of attitude scales. In the earlier study, pupil responses were generally favorable. They liked school as a whole, their classmates and teachers, reading and learning, and, although still positively inclined, mathematics least. The scale used for the earlier study was, of necessity, simple in design because the children were so young at the time. There were only three possible responses--like, dislike, and neutral. As was to be expected, there were very few negative or even neutral responses(2). Average ratings were very positive, and negative responses were rare (1, pp. 177ff.)

In the present follow-up, a more sophisticated instrument was possible. Semantic differential seven-point scales were developed for ten aspects of school: learning, teachers* (two), classwork, reading; classmates, mathematics, discussion, handwriting, homework, and school in general. There were from five to nine items in each scale, with ratings ranging from one through seven, with seven being the most positive. The scale items were based on the work of Osgood et al. (3)

*Early Astor Program classes usually had two regular classroom teachers.

Students were asked to react to each of these aspects of school as they recalled them from earlier years, from pre-kindergarten through grade 3. In Astor Program classes, children were grouped by levels instead of grades. The correspondence of levels and grades was as follows:

Level I - Pre-K, K or K - 1

Level II - 1 - 2

Level III - 2 - 3 - 4

A few children, because of their age at admission were actually in grade 4 by the time they had reached the Astor Program Level III.

Thus, children were asked to recall their reactions to the ten aspects of school at each of the three levels. They were also asked to react to the same aspects (except for handwriting and a second teacher) for their current class, which might be grade 6, 7, or 8. It will be recalled that these children might be in a variety of situations at this time, some still associated with Astor Program practices, others in mixed classes or even in other school system.

The following trends will be noted from a study of Table IX.

1. All reactions are generally positive across all levels, even for the very least liked aspect of "homework". No mean ratings fell into the neutral or negative categories (Ratings = 1 to 3 negative; 4, neutral). As a matter of fact, negative ratings by individual students were rare.

2. For those students who had been in the Astor Program from the beginning, the Pioneers, there is a noticeable, if not significant, decline toward the neutral rankings for the current class in several items, especially attitudes toward current classmates and classwork. They apparently enjoyed their work in the early grades more and the company of classmates they liked.

TABLE IX

ATTITUDES: REACTIONS OF STUDENTS TO ASPECTS OF SCHOOL AT EACH LEVEL (I,II,III) AND TO THEIR CURRENT CLASS. (Mean Ratings on Attitude Scales)

TOPIC AND GROUP		N	Level I	Level II	Level III	Current Class
READING						
Pioneers	1974-77	13	5.8	6.1	6.5	6.5
Pioneers	1974-82	50	5.7	5.8	5.8	6.3
Others	1977-82	70	5.7	6.3	6.3	6.2
LEARNING						
Pioneers	1974-77	13	5.9	6.0	6.4	6.2
Pioneers	1974-82	50	5.9	5.8	6.0	5.9
Others	1977-82	70	6.0	5.9	5.8	5.9
CLASSMATES						
Pioneers	1974-77	13	6.2	6.1	6.4	5.3
Pioneers	1974-82	50	5.6	5.6	5.5	5.4
Others	1977-82	70	5.5	5.8	5.6	5.5
TEACHER						
Pioneers	1974-77	13	5.8	5.9	6.0	5.4
Pioneers	1974-82	50	6.0	5.6	5.5	4.6
Others	1977-82	70	6.0	5.8	5.9	4.5
CLASS WORK						
Pioneers	1974-77	13	6.0	5.8	5.9	4.7
Pioneers	1974-82	50	5.9	5.6	5.6	4.5
Others	1977-82	70	5.6	5.6	5.7	4.8
SCHOOL						
Pioneers	1974-77	13	5.7	5.8	5.8	5.2
Pioneers	1974-82	50	5.1	5.3	5.4	5.1
Others	1977-82	70	5.0	5.4	5.4	5.2
MATHEMATICS						
Pioneers	1974-77	13	5.4	5.7	5.8	5.7
Pioneers	1974-82	50	5.2	5.3	5.2	5.3
Others	1977-82	70	4.9	5.4	5.4	5.2
DISCUSSION						
Pioneers	1974-77	13	5.4	5.5	5.3	5.5
Pioneers	1974-82	50	5.2	5.1	5.2	5.0
Others	1977-82	70	4.6	5.0	5.1	5.0
HOMEWORK						
Pioneers	1974-77	13	5.1	5.1	5.1	4.3
Pioneers	1974-82	50	4.6	4.5	4.3	4.0
Others	1977-82	70	4.5	4.6	4.8	4.2
HANDWRITING						
Pioneers	1974-77	13	4.3	4.7	5.1	---*
Pioneers	1974-82	50	4.3	4.2	4.3	---*
Others	1977-82	70	4.9	5.3	5.5	---*

*Handwriting or penmanship is not usually taught at the secondary level.

In an accompanying questionnaire, many students reported that they still considered as "best friends" students they met during the pioneer years of the program.

3. The pre-K, K years of Level I are recalled with most favorable reactions, especially by those who left the program in 1977; and recollections of Level II are not far behind.

4. Although the higher levels are also remembered very favorably, there is a slight movement downward as the grades progress. This is consistent with observations in other studies about pupil attitudes toward school (4).

5. As was hoped in the Astor Program philosophy, the students acquired a love of learning and reading which has persisted and even increased in intensity with the passage of time.

6. Students, with few exceptions, recall their teachers in a favorable light, especially those in the prekindergarten/kindergarten years.

7. Mathematics is well liked, but not as much as reading, the liking increasing in later grades.

8. Least popular subjects are consistently handwriting and homework.

9. The rankings of aspects remain approximately the same from level to level, even in the current grade, except for mathematics. It seems that, as children progressed through the grades, their liking for mathematics increased. The love of learning and reading persists, and both areas receive top ratings in the current grade.

Special Subjects Recalled from Early Grades

Since the Astor Program had introduced a far more advanced and "differentiated" curriculum to the classes, we were interested in learning what lasting impression the experience had made. In one questionnaire, the students

were asked: "What are some of the special subjects you learned about in Level I (PreK-K)?"

There was a marked contrast in recollections between students who had entered the Astor Program at the PreK-K level and those who had been added after 1977 in the fourth grade and above. While early Astor Program children remembered a wide variety of subjects and activities, the later group recalled very little and cited only the most conventional primary subjects. An unusually large proportion of children among the later admissions do not remember anything special that they learned during the early years. While only 9.4% to 14.0% of the pioneer Astor Program pupils could not recall anything special they had learned in prekindergarten through grade 3, from 34.3% to 50.0% of the later admissions from other classes could not recall anything special that they had learned during those early years. All of these differences are statistically significant, with $p \leq .01$. (Table X)

TABLE X

COMPARISON OF STUDENT RECOLLECTIONS OF SPECIAL SUBJECTS STUDIED IN PREKINDERGARTEN THROUGH GRADE 3 - PROPORTIONS REPORTING "NONE"

	Early Admissions		Later Admissions		
Level	N*	%	N*	%	p
I	50	14.0	68	50.0	.01
II	53	9.4	73	39.7	.01
III	51	11.8	70	34.3	.01

*Differences in numbers responding are due to pupil omission of the items.

Also significant is the quality of the recollections. Those who attended other classes during the early years recalled such routine subjects as learning the alphabet, arithmetic, writing, spelling, counting, etc. Pioneer Astor Program children mentioned such subjects as astronomy, the planetary system, architecture, probability, ancient Egypt, ecology and nature, creative writing, science, etc. Apparently French was a favorite subject recalled by 30 %, 24.5% and 13.7% of the children in each grade sequence or level. It was not expected that the children admitted to later grades would mention learning a foreign language, since this is not a common practice in the schools, certainly not at this age. Yet, it is precisely at this age level that children do pick up foreign languages, probably with greater ease than in later years. The pioneer children obviously enjoyed learning the language, as they reported in taped interviews as well as in the questionnaire.

In the following section, responses of the pupils with respect to special topics they learned in the first three levels are given. The great variety of topics mentioned, especially by the Astor Program pioneers, will be noted. Also noteworthy are several instances where the responses of the groups are sufficiently different to be statistically significant. These are discussed in the following sections and the data are summarized in Table XI.

Reading. In the analyses, reading was examined as a topic separate from the other language arts. It was interesting to note that a significantly larger proportion of pioneer students recalled their earlier reading experiences in Level I, 28.0% vs. 8.8% for the later admissions ($p \leq .01$). The reading experience was important to all the students, as they commented in

TABLE XI

RECOLLECTIONS OF TOPICS STUDIED IN GRADES CORRESPONDING TO THE ASTOR PROGRAM LEVELS I, II, III BY PIONEER PUPILS AND OTHERS ADDED IN LATER GRADES
(In Frequencies and Percentages)

TOPIC		Level I PIONEERS	Level I OTHERS	Level II PIONEERS	Level II OTHERS	Level III PIONEERS	Level III OTHERS
READING	f	14	6	9	18	9	8
	%	28.0	8.8	17.0	24.7	17.6	11.4
% difference		19.2**		7.7		6.2	
LANGUAGE ARTS	f	7	22	17	17	16	18
	%	14.0	32.4	32.1	23.3	31.4	25.7
% difference		18.4**		8.8		5.7	
SOCIAL STUDIES	f	0	2	2	2	9	13
	%	0.0	2.9	3.8	2.7	17.6	18.6
% difference		2.9		1.1		1.0	
SCIENCE	f	12	4	16	4	15	12
	%	24.0	5.9	30.2	5.5	29.4	17.1
% difference		18.1**		24.7**		12.3	
MATHEMATICS	f	8	4	15	11	12	12
	%	16.0	5.9	28.3	15.1	23.5	17.1
% difference		10.1**		13.2**		6.4	
ARITHMETIC PROCESSES	f	0	7	1	7	6	11
	%	0.0	10.3	1.9	9.6	11.8	15.7
% difference		10.3**		7.7*		3.9	
MUSIC	f	6	4	8	3	5	4
	%	12.0	5.9	15.1	4.1	9.8	5.7
% difference		6.1		11.0**		4.1	
ART	f	7	4	4	3	2	3
	%	14.0	5.9	7.5	4.1	3.9	4.3
% difference		8.1		3.4		0.4	
OTHER AREAS	f	5	9	4	5	9	4
	%	10.0	13.2	7.5	6.8	17.6	5.7
% difference		3.2		0.7		11.9**	
Number of Pupils		50	68	53	73	51	70

*Significant, $p \leq .05$
**Significant, $p \leq .01$

interviews and showed by their reactions on the attitude scales. The early encouragement and exposure to reading are evident in the pioneers' recollections. For students admitted after 1977, the experience would usually come later, in grades one and two, and this is reflected in their responses for that level, where the frequencies for this later group are greater than those for the pioneer group. The difference, however, is not statistically significant. (Table XI)

Language Arts. The basic skills of the language arts were analyzed separately from reading and literature. Included in this category were such specifics as learning the alphabet, grammar. word structure, vocabulary, dictionary work and word games, spelling, handwriting, creative writing and reports. As is characteristic of the early recollections of the non-pioneer students, there is a focus on the conventional curriculum and basic skills of the language arts. While 32.4% of these pupils recalled these aspects from their kindergarten period, only 14.0% of the pioneer group did so. This is a statistically significant difference, with a $p \leq .01$. Recollections for the later grades followed the same trends, but were not statistically significant. (Table XI)

Social Studies. Although students mentioned specific areas of the social studies curriculum, including geography, history (American and Black), ancient Egypt, New York City, and research activities, there were no notable differences in the proportion of recollections of the two groups. (Table XI)

Science. The area of science yielded some of the most dramatic differences between the two groups. Recollections of pioneer students included such specific topics as a science fair, trips, astronomy, solar system, atomic structure, ecology, nature study, trees, archeology, zoology, animals, dinosaurs, nutrition, and weather. For the first two grade sequences, the differences between the groups were statistically significant ($p \leq .01$), and for the third level, the p was $\leq .10$, which may indicate a trend, but is not significant statistically. For the first and second grade sequences the comparisons, in per cents, were as follows: pioneers, 24.0% and 30.2% versus 5.9% and 5.5% for the later group. In the third grade sequence, Level III, the percentages were 29.4% for the pioneers and 17.1% for the other group. The quality of the recollections of the pioneer students,reflecting the diversity and advanced calibre of the Astor Program curriculum, is especially impressive in this area. (Table XI)

Mathematics. Again, in mathematics, the post-1977 group tended to recall the specific basic skills usually taught in the earlier grades, while the pioneer students responded by referring to the broader term "mathematics". For example, in recalling their prekindergaten/kindergarten experiences, the pioneers cited mathematics only, while the Post-1977 group cited such specific topics as counting, numbers, addition, subtraction, etc., and only about one-third of their responses referred to mathematics. The difference between the two groups is statistically significant, with $p \leq .05$. Also significant is the difference in responses for Level II, with $p \leq .01$. For Level III, the responses did not differ significantly between the groups. (Table XI)

Art. Students mentioned studying architecture, coloring, finger painting, sketching, photography and drawing as art experiences they had had in the primary grades. For the first two grade sequences, the pioneer students mentioned these art experiences more frequently than the later group, but the differences were not statistically significant. For Level I, where the difference in responses was greatest, 14.0% vs. 5.9%, the p was $\leq$ .10.

Music. Pioneer students told us in questionnaires and in interviews that they had enjoyed their music experiences, especially in Levels I and II. The results of this analysis show differences favoring the pioneer students for all three grade sequences, but only the second(Level II) yielded a statistically significant difference, $p \leq .05$. The percentages were 12.0%, 15.1% and 9.8% for the pioneer students as compared with 5.9%, 4.1% and 5.7% for the later students.

Other Areas. Besides the major curriculum areas cited above, students listed many more general topics which they recalled studying during the early grades. These were: drama, arts and crafts, cooking, career study, games and gymnastics, hobbies. They also mentioned discussions of values, such as helping others, being kind, friendship, getting along with others, keeping out of trouble, and family activities. There were no notable or significant differences between the pioneer and other students for Levels I and II. For Level III, there was a significant difference in the number of topics recalled favoring the pioneer group, 17.6% vs. 5.7%, with $p \leq .01$.

Summary. The foregoing analysis of pupils' recollections of topics they studied during the prekindergarten-grade three period revealed these interesting points about those who had been in Astor Program classes from prekindergarten through grade three, the "pioneers":

1. They recall significantly more topics and areas studied than those who joined them after the third grade.

2. Subjects recalled more frequently by the pioneer group than the later group include science, reading and literature, mathematics, art and music. while the later admissions recalled learning basic skills aspects of the language arts and mathematics.

3. The quality as well as the quantity of recollections by the pioneer students was significantly more advanced than for the later group.

PUPIL REACTIONS TO SCHOOL

In a separate questionnaire, the students were asked to "write four or five sentences about how you felt about school in the early grades." The following are samples of their reactions.

> *I think that in the early grades I enjoyed school. I was part of the first class of the Astor Program and this gave me and my close friends a sort of status. This status made school ever more enjoyable than it was to begin with. I also liked the fact that we always had two teachers to ask questions, ... On the whole I think my early years in the Astor Program were quite worthwhile, and three of the best years of school I've had.*

> *In the Astor Program, I was happy with my classmates, teachers, and work. It was especially enjoyable because of the wonderful children there. The work was interesting, which was very important so the students wouldn't get bored. If I had a choice, I would go back to the Astor Program.*

> *I especially enjoyed learning during this period. The schoolwork constantly challenged me, and I generally did very well (except in math). The only thing I truly disliked about school was my lack of popularity and my inability to get along with my classmates. However, as a learning experience, I enjoyed it.*

In Level II, I remember we did creative writing a lot, where the teacher would give us a starting sentence and we would develop it, and I enjoyed this a lot. In Level I, I remember how nice all the teachers were to us when we were there, and I remember some of the class discussions that we used to have. From Level I, I also remember how much we all enjoyed it when the teacher played the piano for our class.

I enjoyed it very much..... . I was enthusiastic, especially in Level III, because I liked my teachers very much. The subjects were fun enough to be enjoyable, but there were also serious subjects where fun and foolery were out.

I think that the Astor Program gave me a good starting experience in school. I have to say that Level II was my best year ever in school. I learned the most I ever have in the Astor Program.

I liked school a lot. In kindergarten, I had two very good teachers and school was very enjoyable. In first grade the teachers were good, and we had several animals, such as two rabbits. (I love bunny rabbits.) In second grade, I had one of the teachers I had had in kindergarten. I liked her a lot. We did nice things that year. I enjoyed school a great deal in those years.

It is interesting to note that other children who had been added to the Astor Program classes after grade three recalled their kindergarten/primary years somewhat differently. Although most made favorable comments, they also added negative statements which were not found among the remarks made by the pioneer Astor Program children. For example:

I liked it but it was babyish. I liked learning and free time. My teachers were nice.

I enjoyed school and being with my friends, but, until I moved to New York in the third grade, I didn't learn much. I learned the basics like reading, adding, and subtracting, but nothing much.

I did not have any strong feelings about my school in such early grades because nothing really happened except for taking naps and drawing and eating, which was not something to feel good or bad about. In second grade, school was not terrific because I hated our teacher and she was never there. She was always sick or something.

I thought kindergarten and grades one and two were fun, but it was almost all fun and games. Because of this I did not learn as much as I could have.

In kindergarten we learned a lot, but it was very crowded. It was the same in first and second grade. The teacher also couldn't get to us fast enough, so I couldn't get as much done as I should have.

Well, I didn't mind too much. It was fun, but it was a little easy and the kids weren't very grown up. But then I came to this school in Level III. I was scared because I was aware this was a special program. I didn't know how to act or anything.

In kindergarten, I was smarter than the others, so I had harder work. I didn't mind that then. In first grade, my teacher was always yelling. She was mean. In second grade, my teacher was very nice.

Strangely, or perhaps happily, there are no comments like these negative reactions among the responses of children who had been in the Astor Program during the early school years. Children who were in the beginning grades of the Astor Program cite the interest and challenge of the work and specific learning experiences. For example:

In kindergarten, I loved the French. I wish it was continued.

I liked studying trees . . . I also liked writing journals about what we did on the weekend.

Our math teacher made me love math.

We had so many classroom pets, it was like a zoo.

In Level I, I remember learning Roman numerals.

In second grade, our teacher would read to us in the Reading Space, a little place behind the bookcase. Those were the good days.

It was a wonderful program.

I learned a lot and, at the same time, I had fun.

It was an experience to remember. . . I'm grateful for it.

In kindergarten, my class had spectacular experiences.

SUMMARY

After reading the children's recollections of the program and analyzing the more objective reaction questionnaires, the conclusion is inevitable. The children enjoyed their early experiences in the Astor Program classes and, in the words of two of them: "It was an experience to remember." "It was a wonderful program." That had been our goal, to have the students enjoy the experience; and it is gratifying to find that, even after several years, the students remain enthusiastic about their experience.

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CURRENT ACHIEVEMENT AND REACTIONS OF SECONDARY SCHOOL STUDENTS TO THEIR EXPERIENCES IN AN EARLY CHILDHOOD PROGRAM FOR THE INTELLECTUALLY GIFTED: A Longitudinal Study of the Astor Program

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ABSTRACT

The Astor Program had its beginnings at a time when there were no provisions or programs for the gifted child at the prekindergarten/primary grade levels in public schools. It was a pioneer effort which has become known internationally as a model for such education, especially because the philosophy and practices were demonstrated to be successful, not only in terms of pupil achievement and reactions, but also in terms of administrative feasibility and adaptability, parent satisfaction, and teachers' professional growth and commitment. The curriculum materials developed specifically for the classes are in continuous demand.

The present study, conducted from nine to ten years after the first classes began, has followed the students into the secondary grades and has investigated such questions as: Did the highly differentiated curriculum designed for these children have an impact? Are they still achieving at the high levels they attained while participating in the Astor Program? What are their reactions to the experience? Were they happy? Did they like their teachers? What do they remember learning during those early years? These and other questions were explored in the follow-up study, leading to the conclusion that a) the students maintained their high levels of achievement; b) they recalled their early experience in a most favorable light; c) they retained the love of learning and generally positive feelings that were specific goals of the curriculum; and d) they remembered significantly more about their early learnings than students of comparable ability who had not participated in the early program.